Amendments to the Specification

Title

Page 1, line 1, please replace the title with the following:

Method of Controlling Quality of Service of CDMA System using Dynamic Adjustment of Parameters Representing Transmitting Properties Concerning Quality of Service

Page 1, lines 4-5:

This application claims priority of EPO application serial number ~~00311161.4 2211~~ 00311161.4 filed on ~~June 28, 2001~~ 14 December, 2000.

Page 1, lines 14-20:

As known in the art, the quality of services (QoS) in terms of a desired bit-error-ratio (BER) or block-error-ratio (BLER) within CDMA (code division multiple access) systems, as for example a mobile telecommunication network can be mainly achieved by probably adjusting the transmission power. Especially, with regard to such mobile telecommunications networks a combination of an inner loop and outer loop power control (PC) is created for systems of a second generation according to the specified IS-95 standard, wherein that power control combination works very ~~efficient~~ efficiently for single voice services.

Page 2, lines 6-14:

A second one of these parameters is a static rate matching factor (SRF) which is used to balance the transmission power requirements of different transport channels that are multiplexed onto one code composite transport channel (CCTrCH). The static rate matching is a physical function and is also known as "E_S/N_0 (data bit energy to noise power density ratio)-balancing". This static rate matching function is controlled ~~wire~~ with the semi-static part of the transport format combination set (TFCS).

Page 3, lines 5-17:

According to the 3GPP specifications (3GPP UMTS TS 25.213 "Spreading and modulation (FDD)") a power-offset factor between the dedicated physical control channel and the dedicated physical data channel is defined as being a power-offset factor „G" representing a

ratio of amplitudes. The value of „G" must be adjusted such, that the ratio of the data bit energy

to background noise density and hence the transmission power requirements of the dedicated

physical control channel and the dedicated physical data channel are met without wasting ~~to~~ <u>too</u>

much power. For example, a high data rate dedicated physical data channel has to be transmitted

with a higher transmission power than the low data rate dedicated physical control channel.

Page 3, lines 18-23:

According to the current 3GPP specifications the target SIR is dynamically handled by

the inner loop and outer loop power control procedures. The power-offset and the static rate

matching factor, however, are determined at the ~~begin~~ <u>beginning</u> of the transmission and are kept

constant during the entire transmission.

Page 3, lines 24-35:

A disadvantage is, since the above three parameters strongly depend on the ratio of bit

energy to background noise density (E_b/N_0) on each transport channel, that for determining a

certain amount of target SIR, static rate matching and power-offset it has to be assumed that the

E_b/N_0 values are roughly constant. However, it is well known that each of ~~that~~ <u>the</u> bit energy to

background noise density ratios will change depending on the radio bearer service behavior, such

as the service multiplexing and data rates, and the environment, such as the speed of a mobile

station, interference situation and propagation conditions, for example.

Page 4, lines 11-14:

The inventive solution is characterized by a method, a system, a base station, a mobile

station and ~~an~~ implementation software incorporating the features of ~~claim~~ <u>the</u> claims ~~1, 15, 21,~~

~~22 and 23, respectively~~.

Page 4, lines 15-30:

Accordingly, the invention proposes and uses a dynamic quality control for adjusting

quality of services of a CDMA-based System transmitting a plurality of different services

between the system and a user equipment by using at least ~~on~~ <u>one</u> data channel with the services

multiplexed and rate matching technique applied and an associated control channel wherein

parameters representing transmitting properties concerning the quality of service, advantageously representing a signal to interference ratio for the control channel, a static rate matching factor for each service and a power-offset between the control channel and the data channel are derived for each service to achieve desired quality of services, during an installation process based on default quality requirements and during an operating condition dynamically in dependence of quality estimates performed on each of ~~that~~ the services during data transmission.

Page 4, line 31 through Page 5, line 6:

According to preferred embodiments the invention proposes the use of a variety of measurements or estimates of the user behavior, in particular the bit-error-rate or block-error-rate and the data rates and of the environment, such as the speed of the user equipment or interference. Thus with the inventive approach it is able to handle variations not only on the reliability qualities (BER/BLER) on all transport channels but also differences between various transport channels dynamically resulting in ~~an~~ a significant improvement of saving radio resources. Moreover since the invention uses radio resource control procedures that are currently defined in the 3GPP standards an easy implementation is ensured to adapt current CDMA-Systems.

Page 5, lines 7-26:

According to further preferred embodiments a look-up-table for the default values in combination with an update procedure of the inventive approach is proposed resulting in ~~an~~ a self optimizing behavior. With other words by using the inventive approach implemented within an associated radio network controller of the transceiver of CDMA-System it is enabled to adapt the parameter to unknown environments and the specific radio bearer service behavior. Moreover system units from different venders can be connected to the same radio network controller without exact knowledge of the bit energy to background noise density on each transport channel and of symbol energy to background noise density on the dedicated physical control channel since an iteration to these values is achieved ~~to~~ by setting some predefined values and using the inventive update procedures. Consequently, the inventive approach supports multi-vender environment in ~~an~~ a very efficient manner. Furthermore, such a look-up-table for the default

values also can be reused for radio resource allocation reasons, such as for the purpose of admission control or the resource allocation.

Page 7, lines 10-16:

Furthermore, the number of multi-codes used is „m", i. e. with m > 1 more than one dedicated physical data channel DPDCH is assigned to ~~on~~ one code composite transport channel (CCTrCH). Each of the dedicated physical data channels, i. e. each $DPDCH_i$, with $1 \leq i \leq m$, has the same energy per encoded symbol to noise ratio E_S/N_0 and the same data symbol rate R_S. The number of symbols is N_S.

Page 12, lines 28-34:

It should be noted, that if the bit-error-rate or block-error-rate of one transport channel is significantly worse than the threshold, the static rate matching parameter will be adjusted. However, since the static rate matching parameters is never ~~be~~ set perfectly the SIR target will always have to respond to a misalignment in the bit-error-rate or block-error-rate targets.

Page 12, line 35 through Page 13, line 6:

A preferred handling of the power-offsets is as follows: If the target SIR reaches ~~an~~ a upper limit, the power offsets between DPCCH and DPDCH are increased by the same amount for all transport format combination sets TFCS. If the target SIR reaches an lower limit, the power offsets are decreased accordingly. The upper and lower limits of the target SIR depend for example on the initial target SIR and the amount of increasing or decreasing is determined regarding the environment measurements 3.

Page 13, line 33 through Page 14, line 13:

Although a cell is configured for a certain target environment there are really an infinite number of possible environments within a cell. Therefore, it is ~~propose~~ proposed that the default table 2 recognizes this range in environments and is set for an average case. Furthermore, in some cases the default table 2 can be improved to contain different average values for different sub-sets with the complete range of possible environments. Nevertheless, the average case is chosen such that all final parameters can be reached efficiently and no particular parameters are

favored. Therefore, the default values should only be changed if the average value needs to be updated. An update function device 6 stores the current E_b/N_0 values in the default table 2 of the default E_b/N_0 together with the current mix of data rates R_b of each transport channel, as depicted by reference sign 7 of Fig. 2, and the current environment measurements 3. Accordingly, this procedure helps to find more accurate E_b/N_0 values for certain service mix and environments.

Page 14, lines 18-20:
Summarizing the above [[,]] a method or implementation according to the invention has the following properties with regard to the prior art:

Page 14, line 21 through Page 15, line 14:
While a conventional outer loop power control controls only the target SIR on the DPCCH the inventive quality controlling approach additionally adjusts the power offset between the DPCCH & DPDCH and the static rate matching attribute, dynamically. Furthermore, the proposed inventive method using a variety of measurements of the user behavior and of the (current) environment is able to handle variations not only on the quality, i. e. the bit-error-rate or the block-error-rate, on all transport channels but also differences between various transport channels and hence is saving radio resources. Since the inventive method uses radio resource control procedures that are currently defined in the 3GPP standards, especially the outer loop power control and transport channel reconfiguration procedures, an implementation of the inventive method is significantly simplified. Moreover by using a table for the default values in combination with the update procedure the inventive method has a self optimizing behavior, i. e. by use of the inventive approach, a radio network controller incorporating the implemented inventive method is able to adapt its parameter set to unknown environment and radio bearer service behavior. Furthermore, ~~NodeBs~~ <u>Node Bs</u> from different vendors can be connected to the same radio network controller without exact knowledge of the E_b/N_0 on each transport channel and of the E_s/N_0 in DPCCH since an iteration to these values can be achieved by setting some pre-defined values and using the update procedure. Hence the inventive approach supports a multi-vendor environment in an efficient manner. Moreover, the default value table 2 also can be re-used by the radio resource allocation, such as for the purpose of admission control and resource allocation for example.

6